TABANIDÆ OF THE PENINSULA OF YUCATAN, MEXICO, WITH DESCRIPTIONS OF NEW SPECIES

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The present paper covers the Tabanidæ known at present from the Mexican portion of the Peninsula of Yucatan, including the States of Campeche and Yucatan and the Territory of Quintana Roo. It is based in the first place upon extensive collections made, in 1929 and 1930, by the expedition organized by the Department of Tropical Medicine of Harvard Medical School, under the auspices of the Carnegie Institution of Washington, D. C., and under the leadership of Dr. George C. Shattuck. I have also studied a few Yucatan specimens at the United States National Museum and a cotype of *Tabanus hæmagogus* at the American Museum of Natural History.

Subfamily Pangoniinæ

Tribe *Chrysopini*

Chrysops variegata (Degeer)

Tabanus variegatus de Geer, 1776, 'Mém. pour servir à l'Hist. des Ins.,' VI, p. 230, Pl. XXX, figs. 7–8 (♀; Surinam). Not *Tabanus variegatus* Fabricius, 1805.

Chrysops variegata J. Bequaert, 1926, 'Medical Rept. Hamilton Rice 7th Exped. Amazon,' p. 220, fig. 7*a*.

Tabanus costatus Fabricius, 1794, 'Ent. Syst.,' IV, p. 373 (without locality).

Heterochrysops costatus Kröber, 1926, Stettin Ent. Zeitg., LXXXVII, pp. 213 and 231 (♀ ♂); 1929, Deutsch. Ent. Zeitschr., (1928), p. 426.

Heterochrysops variegatus Kröber, 1929, Ann. Naturh. Mus. Wien, XLIII, p. 244.

Chichen Itzá, State of Yucatan, one female, February, 1930, (Dr. G. C. Shattuck).

I have fully discussed the synonymy and distribution of *C. variegata* in a previous paper. This fly reaches its northern limit in Mexico, where it has been taken also at San Rafael in Vera Cruz, Teapa in Tabasco, and the Volcano Colima in Jalisco. It has never been found north of the Tropic of Cancer.

Kröber (1925) has attempted to define a number of varieties of this species, but I doubt whether any of them are worthy of recognition by name. The var. *subfascipennis* (Macquart) appears to be based upon poorly preserved specimens, in which the longitudinal bands of the thorax were more or less faded. The var. *peruviensis* Kröber is separated from the typical form by slight differences in the extent of the dark markings of the wings, a character which is subject to much individual variation. As for the var. *venezuelensis* Kröber, it seems to differ from *C. crucians* var. *ecuadorensis* (Ad. Lutz) only in the hyaline spot of the discal cell. Moreover, *C. crucians* Wiedemann is, in my opinion, closely allied to *C. variegata,* the shape of the antennæ of both species being extremely similar. This character is much more important in indicating true relationships than the presence or absence of a hyaline spot in the discal cell, according to which Kröber places these two species in different genera or subgenera.

In a recent paper, Curran (1931, American Museum Novitates, No. 456, p. 3) claims that in *C. variegata* "the spurs on the posterior tibiæ are so small as to be almost wanting, and I am not sure that they are always present." He regards this species as "rather aberrant," and in his key infers that the genus *Chrysops* might not always be readily separable from *Diachlorus.* Although the tibial spurs of *C. variegata* are smaller than those of some other species of the genus, I have had no difficulty in finding them in 125 specimens, when the proper magnification was used. It is, of course, possible that these structures may sometimes be broken off accidentally. The characters given in Curran's key to differentiate between *Diachlorus* and *Chrysops* do not apply to all the species of these genera. Some species of *Chrysops* have the face evenly convex, without even a trace of swellings; while the width of the frons varies considerably in both genera. The two are, however, readily separated (apart

from the presence or absence of tibial hind spurs) by the different structure of the antennæ. In *Diachlorus,* the antennæ are decidedly of the *Tabanus*-type, with the second segment short, less than half the length of the first.

Chrysops incisa (Macquart)

Chrysops incisus Macquart, 1845, Mém. Soc. Sci. Lille, (1844), p. 176, Pl. IV, figs. 12 and 12*a*; 1846, 'Dipt. Exot.,' Suppl. I, p. 44, Pl. IV, figs. 12 and 12*a* (♀; New Grenada = Colombia). Walker, 1854, 'List Dipt. Brit. Mus.,' V, Suppl. 1, p. 285. Schiner, 1868, 'Reise Novara, Zool., II, Abt. 1, Vol. B, Dipt.,' p. 104 (♀ ♂). Hunter, 1900, Trans. Amer. Ent. Soc., XXVII, p. 135. Ricardo, 1901, Ann. Mag. Nat. Hist., (7) VIII, pp. 310 and 312 (♀ ♂). Kertész, 1908, 'Cat. Dipt.,' III, p. 188. Surcouf, 1921, 'Gen. Insect., Taban.,' p. 152. Hine, 1925, Occas. Pap. Mus. Zool. Univ. Michigan, No. 162, p. 14.

Southeast of Peto, Territory of Quintana Roo, June 5 to 10, 1929, three females attacking horses (G. C. Shattuck).

These specimens have a broad pale band, covered with yellowish hair, on each side of the mesonotum (above the wing), and a large hyaline emargination of the black cross-band of the wing (extending from the hind margin to near the discal cell). The sides of the first and second tergites are extensively yellowish and the pale median triangles of the abdomen are much larger than in *C. latifasciata* Bellardi (= *neglectus* Williston), *C. leucospila* Wiedemann, and *C. melæna* Hine, all of which differ also from *C. incisa* in lacking the yellow stripes on the sides of the mesonotum. My interpretation of *C. incisa* agrees with that of Hine (1925). Kröber's *incisa* (1925, Konowia, IV, pp. 215, 225, 229 and 344, Pl. I, fig. 13; Pl. III, figs.; and Pl. V, figs.; ♀ ♂) appears to be based upon a mixture of at least two species. His main description of the female seems to fit best *C. melæna* Hine, since the thorax is said to be unstriped and the hyaline marginal spot of the fifth posterior cell to invade the fourth. He mentions, however, that in three females the hyaline spot is restricted to the fifth posterior cell and his figure of the wing appears to be drawn from one of these specimens, which ob-

viously were *C. latifasciata* Bellardi (as interpreted by Hine). To attempt the identification of Kröber's supposed male of *C. incisa* would be mere guesswork; the locality of this male is not given.

Although I have followed Hine's interpretation of *C. incisa,* it must be admitted that Macquart's description could equally well cover any of several species of this group. It might even be claimed that, since Macquart did not mention the lateral stripes of the thorax, he did not have before him Hine's *C. incisa,* but rather *C. melæna* Hine. On the other hand, in Macquart's figure, the hyaline spot of the hind margin of the black crossband of the wing is seemingly too large for *C. melæna,* though it is smaller than in the Central American specimens here referred to *C. incisa.* It is doubtful whether, in the absence of Macquart's type, any certainty can be reached in the matter. Kröber did not study the type.

Tribe *Pangoniini*

Esenbeckia illota (Williston)

Pangonia illota Williston, 1901, 'Biol. Centr.-Amer.,' Dipt., I, pp. 253 and 254 (♀; Ruatan Island, Honduras). Aldrich, 1905, 'Cat. North Amer. Dipt.,' p. 193. Kertész, 1908, 'Cat. Dipt.,' III, p. 155.

Pangonius illota Surcouf, 1921, 'Gen. Insect., Taban.,' p. 128. Hine, 1925, Occas. Papers Mus. Zool. Univ. Michigan, No. 162, p. 5.

Esenbeckia illota Enderlein, 1925, Mitt. Zool. Mus. Berlin, XI, 2, p. 288.

Esenbeckia ferruginea J. Bequaert, 1925, '13th Rept. United Fruit Co., Med. Dept.,' (1924), p. 25. Not of Macquart, 1838.

Territory of Quintana Roo, one female (U. S. Nat. Mus.).

I have seen this species also from British Honduras (Benque Viejo) and the Republic of Honduras (Prieta). Superficially it resembles *E. ferruginea* (Macquart), of South America (Venezuela and Brazil), with which I formerly confused it. The two species may be separated by the color of the abdomen: in *ferruginea,* the first and second segments are colored alike and

bear the same yellowish pubescence; whereas in *illota,* the first segment is ivory-white, much paler than the yellowish second segment, and covered with whitish hairs.

Scione aurulans (Wiedemann)

Pangonia aurulans Wiedemann, 1830, 'Aussereurop. Zweifl. Ins.,' II, p. 620 (♀; Mexico). Walker, 1854, 'List Dipt. Brit. Mus.,' V, Suppl. 1, p. 120. Osten Sacken, 1878, Smithson. Miscell. Coll., No. 270, p. 52. Ricardo, 1900, Ann. Mag. Nat. Hist., (7) V, p. 170. Aldrich, 1905, 'Cat. North Amer. Dipt.,' p. 193. Kertész, 1908, 'Cat. Dipt.,' III, p. 152.

Pangonius aurulans Surcouf, 1921, 'Gen. Insect., Taban.,' p. 127.

Scione aurulans Hine, 1920, Ohio Jl. Sci., XX, p. 314; 1925, Occas. Papers Mus. Zool. Univ. Michigan, No. 162, p. 9.

Rhinotriclista aurulans Enderlein, 1925, Mitt. Zool. Mus. Berlin, XI, 2, p. 302. Kröber, 1930, Stettin. Ent. Zeitg., XCI, 2, p. 147 (♀ ♂).

Pangonia rostrifera Bellardi, 1859, 'Saggio Ditter. Messic.,' I, p. 47 (♀ ♂; Mexico). Osten Sacken, 1878, Smithson. Miscell. Coll., No. 270, p. 52. Williston, 1901, 'Biol. Centr.-Amer.,' Dipt., I, pp. 252 and 253. Aldrich, 1905, 'Cat. North Amer. Dipt.,' p. 193.

Pangonia (*Erephrosis*) *rostrifera* Ricardo, 1900, Ann. Mag. Nat. Hist., (7) V, p. 169.

Pangonia (*Erephopsis*) *rostrifera* Kertész, 1908, 'Cat. Dipt.,' III, p. 166.

Erephopsis rostrifera Surcouf, 1921, 'Gen. Insect., Taban.,' p. 120.

Scione lurida Enderlein, 1925, Mitt. Zool. Mus. Berlin, XI, 2, p. 301 (♀; Colombia and Manatee, British Honduras). Szilády, 1926, Biologica Hungarica, I, 7, p. 28.

Territory of Quintana Roo, one female (U. S. Nat. Mus.).

I have seen this tabanid also from Mexico, British Honduras (Benque Viejo), Guatemala (Nalsum; Coban; Puerto Barrios; El Rancho; Cayuga), the Republic of Honduras (Lombardia), and Colombia (Vista Nieve, San Lorenzo Mountains). Hine writes of this species: "It is an annoying fly where it abounds.

It appeared to keep close to the ground and with its long proboscis had no trouble biting through one's trousers. More than a score of specimens were actually counted on my clothing at one time.''

Hine appears to be correct in synonymizing *Pangonia rostrifera* Bellardi with Wiedemann's *aurulans,* both of which were described from Mexico. At the Museum of Comparative Zoölogy, there is a female from Mexico, labelled ''*rostrifera* Bell.'' by Osten Sacken, which agrees entirely with Hine's and my idea of *Scione aurulans.* Hine regards *Diclisa misera* Osten Sacken (1886, 'Biol. Centr.-Amer.,' Dipt., I, p. 47; ♀; Lanquin and Panima, Guatemala) also as identical with *S. aurulans.* According to Enderlein, however, *misera* is a distinct species, which has the pubescence of the dorsum of the abdomen brownish-black (''schwarzbraun''), except for rather broad apical margins of golden-yellow hairs. In *aurulans,* the pubescence is golden-yellow over the entire dorsal surface. In all the specimens I have seen, the pubescence is as described by Enderlein for *aurulans. S. lurida* was evidently based upon a *S. aurulans* with abnormal venation.

Enderlein's ''genus'' *Rhinotriclista* differs from *Scione* only in that the second branch of the fourth longitudinal vein runs out to the hind margin, thus completely separating the second and third posterior cells; whereas in *Scione* this branch stops before the margin. I cannot believe that so slight and variable a peculiarity of the venation is of generic or even subgeneric value. Kröber recently (1930) reached the same conclusion, although he retained the name *Rhinotriclista* in his grouping of the species.

Subfamily TABANINÆ

Tribe *Tabanini*

Tabanus Linnæus

The following key will enable one to name the species of this genus known thus far from the Peninsula of Yucatan.

1. Second posterior cell closed and petiolate before the hind margin of the wing; fork of third longitudinal vein with appendix. Reddish-brown; abdomen with a median row of small and rather faint triangles of

yellowish hairs on the hind margins of the tergites; scutellum with a large, velvety-black spot, enclosed in a ring of yellowish hair. Length, 15 to 17 mm. ..... *T. oculus* Walker.

Second posterior cell open at the hind margin; fork of third vein as a rule without appendix. Scutellum without conspicuous black spot 2

2. Abdomen reddish-brown to black, some segments partly or mostly covered with white or yellow pile, forming cross-bands, sometimes widened in the middle and at the sides 3

Abdomen reddish-brown to blackish, with one or three longitudinal pale stripes or irregular rows of pale triangles 4

3. Legs and palpi entirely black; antennæ mostly reddish. Dorsum of thorax and most of second and fourth tergites covered with yellow or white pile. Length, 9 to 11 mm. ..... *T. itzarum* J. Bequaert.

Legs black, with all the tibiæ very extensively white; palpi and antennæ black; scutellum and sides of thoracic dorsum white-haired; second to sixth tergites with white apical margins, much broader on the second and fourth than on the others. Length, 11 to 13 mm. *T. leucaspis* Wiedemann.

4. Abdomen reddish-brown to blackish-brown, with a median, longitudinal, irregular but continuous, pale stripe (often faint), consisting of elongate triangles; no lateral spots. Wings somewhat infuscated, clearer in the center of the cells. Length, 10 to 15 mm. *T. hæmagogus* Williston.

Abdomen dorsally with three pale stripes or with three rows of pale spots 5

5. Frons very wide, nearly parallel-sided, only a little more than twice as long as wide 6

Frons much narrower, slightly narrowed below, four to six times as long as wide 7

6. Fork of third vein with long appendix. Abdomen with a pale mid-dorsal stripe, connected with the pale hind margins of the several tergites; the lateral pale spots transverse or oval, often small, and generally free from the hind margins. Frontal callosity occupying the entire width, rectangular, shiny black. Length, 9 to 11 mm. *T. littoreus* Hine.

Fork of third vein without appendix. "Abdomen brownish-yellow; a well-defined, moderately broad median yellowish-white pollinose vitta of even width, becoming indistinct on sixth segment; a brown vitta on each side of and limiting the median vitta, forming a triangle on each side on third and subarcuate marking on each side on second segment; but these brown vittæ are faintly represented in full width on second and third segments by a shading of brown supplementing the triangular and arcuate markings; on the outside of the brown vittæ on each side there is a lateral yellowish-white pollinose vitta like the median one but not so distinct; while still outside of this is

another lateral brown vitta limiting the lateral white one on the inside and parallel with the edge of the abdomen on the outside.'' Frontal callosity nearly square, rounded on upper corners, brown. Length, 8.5 mm. ..... *T. campechianus* Townsend.

7. Frons about six times as long as wide at the subcallus. Third antennal segment short and broad, hardly crescent-shaped, the basal portion rather evenly produced above into a low, blunt triangle. Length, 9 to 12 mm. ..... *T. yucatanus* Townsend.

Frons a little over four times as long as wide at the subcallus. Third antennal segment elongate and slender, distinctly crescent-shaped, the upper projection asymmetrical, with a prominent, blunt edge. Length, 11 to 14 mm. ..... *T. maya* J. Bequaert.

Tabanus oculus Walker

Tabanus oculus Walker, 1848, 'List Dipt. Brit. Mus.,' I, p. 157 (♀; Honduras and Colombia); 1854, *loc. cit.*, V, Suppl. 1, p. 190. Osten Sacken, 1878, Smithson. Miscell. Coll., No. 270, p. 61. Hunter, 1901, Trans. Amer. Ent. Soc., XXVII, p. 146. Bodkin and Cleare, 1916, Bull. Ent. Res., VII, p. 187. Hine, 1925, Occas. Pap. Mus. Zool. Univ. Michigan, No. 162, p. 23.

Bellardia oculus Kröber, 1929, Zoolog. Anzeiger, LXXXIII, p. 121.

Tabanus bipartitus Walker, 1848, 'List Dipt. Brit. Mus.,' I, p. 158 (♀; Honduras); 1854, *loc. cit.*, V, Suppl. 1, p. 190. Osten Sacken, 1878, Smithson. Miscell. Coll., No. 270, p. 60.

Tabanus albo-notatus Bellardi, 1859, 'Saggio Ditter. Messic.,' I, p. 56, Pl. II, fig. 5 (♀; Mexico and Tampico). Osten Sacken, 1878, Smithson. Miscell. Coll., No. 270, p. 60; 1886, 'Biol. Centr.-Amer.,' Dipt. I, p. 55. Hunter, 1901, Trans. Amer. Ent. Soc., XXVII, p. 139. Williston, 1901, 'Biol. Centr.-Amer.,' Dipt., I, pp. 257 and 260. Aldrich, 1905, 'Cat. North Amer. Dipt.,' p. 200. Kertész, 1908, 'Cat. Dipt.,' III, p. 219. Surcouf, 1921, 'Gen. Insect., Taban.,' p. 59. J. Bequaert, 1925, '13th Rept. United Fruit Co., Med. Dept.,' (1924), p. 206.

Bellardia albonotata Rondani, 1863, Arch. per la Zool., Modena, III, 1, p. 81.

Chichen Itzá, State of Yucatan, one female, June 9, 1929. Southeast of Peto, Territory of Quintana Roo, two females, June

5–10, 1929 (G. C. Shattuck). Colonia Santa Maria (near Puerto Morelos), northern part of Quintana Roo, May 13 to 22, 1929, one female (G. C. Shattuck).

I have taken this species also at Sangrelaya, Rep. Honduras, April 13, 1924. It is readily recognized by the large dark spot of the scutellum, surrounded by a pale margin, the closed and stalked first posterior cell, and the long appendix to the fork of the third longitudinal vein. In life the eye usually is dark purple with two bright green cross-bands, one above and one below the middle; more rarely with a third, shorter band in the upper part (Fig. 1*a*).

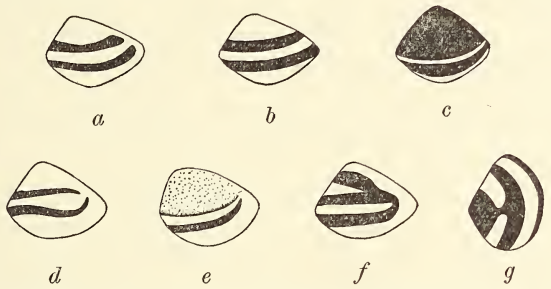

FIG. 1. Markings of the eyes of Yucatan Tabanidæ, in life: *a*, *Tabanus oculus* Walker, female; *b*, *Tabanus littoreus* Hine, female; *c*, *T. littoreus*, male; *d*, *Tabanus yucatanus* Townsend, female; *e*, *T. yucatanus*, male; *f*, *Tabanus maya* J. Bequaert, female; *g*, *Diachlorus ferrugatus* (Fabricius), female. The bright green areas are marked in black, the purple areas in white, and the greenish-purple areas are dotted.

At present *T. oculus* is known with certainty from Mexico (Tampico; Vera Cruz; Teapa and Frontera in Tabasco; Yucatan), Guatemala (Morales), British Honduras (River Sarstoon), and the Republic of Honduras. Walker's record from Colombia, and Bodkin and Cleare's from British Guiana are open to question, since other similarly colored species are found in northern South America.

Tabanus hæmagogus Williston

Tabanus hæmagogus Williston, 1901, 'Biol. Centr.-Amer.,' Dipt., I, pp. 258 and 261 (♀ ♂; Temax in northern Yucatan, Mexico). Aldrich, 1905, 'Cat. North Amer. Dipt.,' p.

204. Kertész, 1908, 'Cat. Dipt.,' III, p. 248. Surcouf, 1921, 'Gen. Insect., Taban.,' p. 70. Hine, 1925, Occas. Pap. Mus. Zool. Univ. Michigan, No. 162, p. 31.

Tabanus filiolus Williston, 1901, 'Biol. Centr.-Amer.,' Dipt., I, pp. 258 and 261 (♀ ♂; northern Yucatan, Mexico). Aldrich, 1905, 'Cat. North Amer. Dipt.,' p. 203. Kertész, 1908, 'Cat. Dipt.,' III, p. 242. Surcouf, 1921, 'Gen. Insect., Taban.,' p. 68.

Chichen Itzá, State of Yucatan, numerous females and two males, June 16 to 30, 1929. Chankom, State of Yucatan, June 20, 1929. Merida, State of Yucatan, common, July 2 to 8, 1929. Izamal, State of Yucatan, July 4, 1929. This species was also very common along the railroad between Dzitas and Merida, numerous specimens entering the coaches at every stop, on July 1st.

I have compared my specimens with a female "cotype" of *T. hæmagogus,* labelled "N. Yucatan. Gaumer," formerly in Williston's collection and now at the American Museum of Natural History. Without this comparison, I could not have been certain of my identification, for Williston does not describe the characteristic markings of the abdomen. It is probable that all his specimens (like his cotype) were poorly preserved. In a fresh condition the abdomen of the female is yellowish-red to blackish-brown, usually darker posteriorly, and bears a narrow and rather inconspicuous, longitudinal, median stripe of gray pruinosity, covered with a few yellowish hairs; the stripe widens slightly at the apical margins of the several segments, thus consisting of a series of elongate lozenges; it is, moreover, readily rubbed off. The median stripe is not visible in my males. In my series of females the length varies from 10 to 15 mm. The males measure 11 to 12.5 mm. At Chichen Itzá I noticed that specimens taken toward the end of June were larger than those flying earlier in the month. After carefully comparing Williston's descriptions, I have reached the same conclusion as Hine, regarding the identity of *T. filiolus* and *T. hæmagogus.* Hine seems to have seen cotypes of both.

T. hæmagogus seems to be peculiar to Yucatan, where it is the most abundant horse-fly in summer, but appears later than the

other three common species. It flies at any time of day, from dawn until sunset, and is even on the wing during rain showers. It readily attacks domestic animals and also bites man. The few males I have taken were resting on leaves at the edges of the woods, early in the morning. In life the eyes of both sexes are uniformly bright green, without bands, and in the male they consist entirely of small facets.

Williston's record of *T. filiolus* from "Antilles, Cuba" was evidently based on the suggested identity of his species with *Tabanus rufiventris* Macquart (1838, 'Dipt. Exot.,' I, 1, p. 141; ♂), described from Cuba (not *T. rufiventris* Fabricius, 1805, nor of Macquart, 1846). The Cuban species is, however, very different and has been fully described by Hine as *T. bifloccus*. Kertész' (1908) record of *T. filiolus* from Jamaica was based upon a similar confusion. So far as known at present, *T. hæmagogus* has not been taken outside Yucatan.

Tabanus littoreus Hine

Tabanus littoreus Hine, 1907, Ohio Naturalist, VIII, p. 227 (♀; Puerto Barrios, Guatemala). Surcouf, 1921, 'Gen. Insect., Taban.,' p. 73. J. Bequaert, 1925, '13th Rept. United Fruit Co., Med. Dept.,' (1924), p. 206 (♀ ♂).

Colonia Santa Maria (near Puerto Morelos), in the northern part of the Territory of Quintana Roo, three females, May 13 to 22, 1929 (G. C. Shattuck).

I have also taken male and female of this species at Puerto Cortez, Rep. Honduras, March 18, 1924, and a female at Puerto Barrios, Guatemala, May 9, 1931, always near electric lights in the evening. It is readily recognized by the unusually broad frons, the shiny black, square frontal callosity, the appendix at the fork of the third longitudinal vein, and the prettily spotted abdomen. In life the eye is dark purple, with two broad, bright green cross-bands (Fig. 1*b*). The male is similar to the female, but the abdominal spots are less distinct; the eye in life is mostly bright green, with two narrow dark purple cross-bands in the lower third (Fig. 1*c*); this lower third, of the usual small facets, is sharply divided from the upper two-thirds, where the facets are much larger.

Tabanus campechianus Townsend

Tabanus campechianus C. H. T. Townsend, 1897, Canad. Entom., XXIX, p. 197 (♀; between Campeche and Esperanza, State of Campeche). Aldrich, 1905, 'Cat. North Amer. Dipt.,' p. 202. Kertész, 1908, 'Cat. Dipt.,' III, p. 232. Surcouf, 1921, 'Gen. Insect., Taban.,' p. 63.

This species is known only from the type specimen. I have failed to recognize it among the many tabanids collected in Yucatan, although it quite likely occurs there. It is small (8.5 mm.), with very broad, parallel-sided frons (about one-sixth the width of the head, and only a little more than twice as long as wide); lower frontal callosity brown, nearly square, a smaller longitudinal callosity above it; thorax with four somewhat indistinct, wide, brownish stripes; abdomen brownish-yellow, with three yellowish-white pollinose stripes; the median stripe well-defined and of even width, the lateral stripes not so distinct and broken up; wings fuscous-hyaline; the costal cells and stigma distinctly yellow; no appendix. It belongs apparently to the group of *Tabanus lineola* Fabricius, which contains many closely allied species in North and Central America. Several of those described from Mexico have never been properly recognized.

The very broad frons places this species near *T. littoreus,* from which it appears to be quite distinct, as shown in my key, where I quote part of the original description *verbatim.*

Tabanus yucatanus Townsend

Tabanus yucatanus C. H. T. Townsend, 1897, Canad. Entom., XXIX, p. 198 (♀; cenote of Xcolak, 10 miles southeast of Izamal, Yucatan); 1897, Trans. Texas Ac. Sci., II, 1, p. 49. Aldrich, 1905, 'Cat. North Amer. Dipt.,' p. 209. Kertész, 1908, 'Cat. Dipt.,' III, p. 293. Surcouf, 1921, 'Gen. Insect., Taban.,' p. 89.

Chichen Itzá, State of Yucatan, many females and two males; common throughout June, 1929. Merida, State of Yucatan, one female, July 6, 1929. Colonia Santa Maria (near Puerto Morelos), in the northern part of the Territory of Quintana Roo, May, 1929 (G. C. Shattuck).

In life, the eye of the female is dark purple to coppery purple with two bright green cross-bands, of which the upper one is rather ill-defined at the inner corner (Fig. 1*d*).

T. yucatanus belongs in the group of trivittate species. The three pale dorsal bands of the abdomen are not continuous: the median one consists of narrow elongate triangles, the apex of which barely reaches the anterior margin of each tergite; the lateral ones comprise slightly oblique spots which reach both the anterior and posterior margins. Fore legs black, the basal third of the tibiæ pale reddish with white hairs; the middle and hind legs pale reddish, with black tarsi; antennæ reddish-brown, with black apical style. Frons slightly narrowed below, about six times as long as wide at the subcallus; the basal callosity elongate-elliptical or subrectangular, barely connected with the very narrow, short median callosity, which extends to the upper third. Length, 9 to 12 mm. It averages smaller than *T. maya*, has a relatively narrower frons, with different callosities, and the antennæ are of a different shape (third segment shorter, less crescent-shaped, with the upper projecting angle much smaller). In perfectly fresh specimens there is a small median area covered with black hairs at the anterior margin of the scutellum.

Male (undescribed).—Extremely similar to the female, with which it is easily associated. The third antennal segment is more slender. The abdominal markings are similar, but somewhat less marked. Eye divided into two areas of unequal extent, the upper area the larger, of enlarged facets; the lower area with the usual small facets; in life dark purple, slightly greenish in the upper area which is separated by a bright green line from the lower area, the latter also with a wide, green cross-band (Fig. 1*e*).

Length, 10 mm.

Allotype and male paratype from Chichen Itzá (Mus. Comp. Zoöl., Cambridge, Mass.).

T. yucatanus is known thus far only from the northern part of the Peninsula of Yucatan, where it is a common fly. It bites horses and mules very readily and will occasionally attack man. The males were observed in the early morning, hovering in clearings of the dry bush, some ten feet above the ground.

The remains of the female and male specimens from Honduras (San Nicolas; San Lorenzo; Sa. Cruz), referred by Szilády (1926, Biologica Hungarica, I, 7, p. 23, Pl. IV, fig. 14) to *T.*

yucatanus, have been sent to me recently by Dr. W. Horn. These specimens were certainly wrongly identified, as is clear even from the figures and from the author's statement that the gray lateral spots of the abdomen were oblique, oval, not reaching the border of the segment. The frons of the female is a little over four times as long as wide at the subcallus (according to my measurements; Szilády's figure shows it too narrow). The markings of the thorax of the male are not by any means as conspicuous as Szilády figures them. The antenna, as drawn by Szilády (now broken off in all specimens), is different from that of *T. yucatanus* and *T. maya*, though more like the former. So far as I can judge from the remaining débris, these specimens of Honduras differ from all named Mexican and Central American species in my collection, as well as from any of the published descriptions. I have, however, two unnamed females from the Colima Volcano, Mexico, which appear to be the same species.

Tabanus maya, new species

A medium-sized, black and reddish-brown species; the abdomen with three longitudinal rows of grayish spots forming continuous, irregular stripes; legs black and reddish-brown, basal half of fore tibiae white; palpi white; antennae reddish-brown; wings subhyaline.

Female.—Length, 11 to 14 mm.; width of head, 4 to 5 mm.; length of wing, 9 to 11.5 mm.

Head black; the ground-color entirely hidden by a pollinosity which is grayish-white on the face and occiput, yellowish on the subcallus and frons; the short, erect hairs of the frons black; the pile of the face longer and white; the jowls with very long, silvery-white pile. Frons (Fig. 2) a little over four times as long as wide at the subcallus, slightly narrowed below; basal callosity black, elongate-rectangular, narrowly separated from the eyes, squarely truncate above; median callosity black, linear, short, not

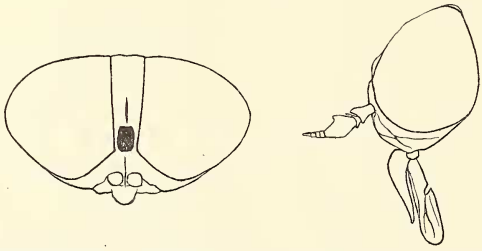

FIG. 2. *Tabanus maya* J. Bequaert, female. Head in front and side-view.

extending beyond the middle and (in fresh specimens) not connected with the basal callosity; vertex without trace of tubercle or bare spot in fresh specimens. Terminal segment of palpus distinctly swollen in the basal half, and rapidly narrowed into the pointed apex; white, with a few, very short, black hairs. Antenna short, bright reddish-brown, the narrow apical portion slightly darker brown; first segment moderately swollen short, with black pile; second segment small, the upper apex very long and slender, with black pile; third segment short crescent-shaped, the basal division much narrowed at the middle, with a prominent but broad and bluntly rounded upper edge. Eyes bare, in life purplish-black with three broad, bright green bands, which fuse before the occipital margin (Fig. 1*f*). Thorax black, covered with ash-gray pollinosity dorsally, more grayish-white ventrally; the pile of the dorsum sparse and short, mostly yellowish-white, mixed with a few black hairs, especially on the scutellum; on pleura and sternum the hairs are much longer and silvery-white; dorsum without traces of longitudinal stripes. Abdomen pale reddish-brown to mahogany-brown, the base infuscated behind the scutellum and hind coxæ; dorsally with three rows of yellowish pollinose spots forming irregular stripes; the median stripe is continuous and consists of a series of narrow truncated triangles, with curved sides; the two lateral stripes are wider, also continuous, but much more irregular, as each of them consists of a series of oblique spots which are broadly separated from the median stripe as well as from the sides; on the extreme sides the dorsum of the abdomen is margined with grayish-white; on the gray spots the short pile is yellowish-white, elsewhere it is black; venter entirely grayish-white pollinose, with short white hairs. Legs normal, without fringes, the fore tibiæ and tarsi slightly wider than those of the other legs; all coxæ with white pollinosity and long white hairs; fore legs black with short black pile, the basal half of the tibiæ bright white, with silvery-white hairs; middle and hind legs mostly yellowish-red and with yellowish white pile, the tarsi infuscated and with black hairs, the basal third to half of the femora black; outer side of the tibiæ with a mixture of short black hairs. Wing subhyaline, with a faint yellowish tinge, somewhat more apparent along the veins; stigma distinct, elongate, amber-yellow; fork of third longitudinal vein without appendix; all posterior cells open; squamæ subhyaline, the notch between them with a tuft of yellowish hairs; halteres yellow.

Female holotype (Mus. Comp. Zoöl., Cambridge, Mass.) and 20 female paratypes, Chichen Itzá, State of Yucatan, June 3 to 16, 1929 (J. Bequaert Collector). A few of these specimens were trapped in a screened cage; some were caught while flying back and forth along trails. None were observed biting.

T. maya belongs in the difficult group of trivittate species, of which some 20 to 30 have been described from the New World.

In view of the fact that several of these species have not yet been satisfactorily cleared up, I feel reluctant to add one more. I have compared *T. maya* with specimens of *T. yucatanus* Townsend, *T. lineola* Fabricius, *T. costalis* Wiedemann, *T. nigrovittatus* Macquart, *T. quinquevittatus* Wiedemann, *T. acutus* Bigot, *T. fuscicostatus* Hine, *T. appendiculatus* Hine, *T. carneus* Bellardi, *T. littoreus* Hine, *T. trilineatus* Latreille, *T. vittiger* Thomson, *T. trivittatus* Fabricius, *T. stenocephalus* Hine, *T. modestus* Wiedemann, *T. plangens* Walker, and *T. cineparius* Wiedemann. From all of these *T. maya* can easily be separated. The majority of these species have the median stripe of the abdomen quite regular and parallel-sided; some differ in having a shiny denuded subcallus, a very broad or very narrow frons, differently shaped antennæ, or the hind femora either wholly black or entirely yellowish-red. I have indicated in the key the characters by means of which the four species of this group, known from Yucatan, may be told apart.

Tabanus itzarum, new species

A small black species, with the dorsum of the thorax and most of the second and fourth tergites and sternites covered with golden-yellow or white, appressed hairs; legs and palpi black; antennæ reddish-brown; wings hyaline.

Female.—Length, 9 to 11 mm.; width of head, 3 to 3.8 mm.; length of wing, 7.5 to 9.5 mm.

Head black, the middle of the face and the subcallus reddish-brown, entirely covered with dark ashy-gray pollinosity; the short erect hairs of frons and face black; the jowls clothed with long, soft pile, mostly pale yellowish. Frons (Fig. 3) a little over five times as long as wide, parallel-

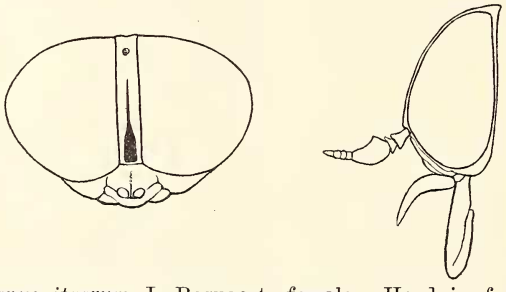

FIG. 3. *Tabanus itzarum* J. Bequaert, female. Head in front and side-view.

sided throughout; basal callosity reddish-brown to black, elongate, gradually narrowed above into a linear, black, median callosity which fades away between the middle and the upper third of the frons; vertex with a small, low, median ocellar tubercle, surrounded by a circular depression; the rudimentary anterior ocellus barely indicated. Terminal segment of palpus moderately slender, very gradually swollen toward the base; black and covered with short, black, appressed pile. Antennæ short, bright reddish-brown, the narrow apical portion slightly infuscated; first segment not swollen, short, with black pile; second segment small, moderately produced at the upper apex, with black pile; third segment short crescent-shaped, the basal division broad throughout, distinctly angular above, but without tooth. Eyes bare, in life uniformly purplish-black. Thorax black, grayish pollinose; the dorsum and scutellum densely covered with short, appressed, bright golden-yellow or pure white pile, the sides with longer, erect, yellow or white hairs, which form a conspicuous tuft beneath the base of the wing. Abdomen pale reddish-brown to black, often darker toward the tip, moderately shiny; typically most of the second and fourth segments, both ventrally and dorsally, are covered with short, appressed, golden-yellow to whitish pile; on the second tergite there is much admixture of short black hairs, which, in some specimens, may cover most of the surface; sometimes there is also an admixture of black hairs on the fourth tergite; the remaining segments with short black hairs, but the sides of the first often with much yellowish pile. Legs normal, black, with short black hair; tibiæ not swollen, without fringes; fore tarsi not dilated. Wings hyaline, very slightly yellowish along the costa; stigma distinct, elongate, amber-yellow; fork of third longitudinal vein without appendix; all posterior cells open; squamæ infuscate, the notch between them with a tuft of yellowish hairs; halteres reddish-brown.

Female holotype (Mus. Comp. Zoöl., Cambridge, Mass.) and 75 female paratypes, Chichen Itzá, State of Yucatan, June 4 to 30, 1929 (J. Bequaert Collector). One female paratype, Merida, State of Yucatan, July 2, 1929 (J. Bequaert Collector). One female paratype, southeast of Peto, near the border of the Territory of Quintana Roo, June 1929 (G. C. Shattuck Collector). Some of the specimens were trapped in a large screened cage; others were taken in the bush, especially toward dusk, when this species darts back and forth in open clearings or along trails. I have never observed it biting man.

T. itzarum is clearly related to *T. leucaspis* Wiedemann and other similarly colored species for which Kröber uses the generic term *Leucotabanus*. In 1929 (Zool. Anzeiger, LXXXIII, pp.

58–63), Kröber included in the same group *T. albicans* Macquart (1846) and *T. pallidus* (Kröber); while more recently (1930, Zool. Anzeiger, LXXXVI, pp. 260–261) he added *T. albidocinctus* Bigot, *T. arvensis* Brèthes, and *T. unicinctus* Walker. All of these species are readily distinguished from *T. itzarum, inter alia,* by the partly white or yellowish tibiæ.

Like many other generic names introduced by Ad. Lutz, *Leucotabanus* is somewhat of a nomenclatorial puzzle. So far as I have been able to trace it, Ad. Lutz and A. Neiva first used it, in connection with the name of a described species, in 1914 (Mem. Inst. Osw. Cruz, VI, p. 71), when they included "*Leucotabanus leucaspis* Wied." in an enumeration of tabanids collected in the State of Rio de Janeiro. A year before (1913, Brazil Medico, No. 45, December 1st, p. 6 of reprint), Ad. Lutz had characterized the genus, but without mentioning a species. I am, therefore, of the opinion that *Tabanus leucaspis* Wiedemann (1828) should be regarded as the type of *Leucotabanus.*

The status of *Pseudacanthocera* Ad. Lutz is analogous to that of *Leucotabanus.* Proposed in 1913 with a description, but without mention of a species, the name was used in 1914 by Ad. Lutz and A. Neiva for "*Pseudacanthocera marginata* (Macq.) = *sylveirii* (Macq.)." Its type is therefore *Silvius sylveirii* Macquart (1838), as correctly stated by Enderlein.

Enderlein (1925, Mitt. Zool. Mus. Berlin, XI, 2, p. 350) regards *Leucotabanus* Ad. Lutz and *Pseudocanthocera* Ad. Lutz as identical with *Pseudoselasoma* Brèthes (1910, An. Mus. Nac. Buenos Aires, XX, p. 475), of which he designated, in 1922, *Pseudoselasoma opacum* Brèthes (1910) as the genotype. I lack the necessary material to discuss this synonymy, which I assume provisionally to be correct. Moreover, I am unable to regard *Pseudoselasoma* (= *Leucotabanus*) as a valid genus; it is at most a subgenus of *Tabanus.* In none of the species I have seen are the ocelli distinctly developed. In most specimens of *T. leucaspis* there is only the slightest trace of an anterior ocellus, while I have seen no examples with even rudimentary posterior ocelli.

Enderlein includes in *Pseudoselasoma* only the following species: *P. opacum* Brèthes, *P. nitidum* Brèthes, *P. sylveirii* (Macquart), *P. leucaspis* (Wiedemann), *P. brevicorne* Ender-

lein, and *P. bicinctum* Enderlein. All of these species are from South America and differ from *T. itzarum* in having the tibiae partly pale-colored.

Tabanus leucaspis Wiedemann

Tabanus leucaspis Wiedemann, 1828, 'Aussereurop. Zweifl. Ins.,' I, p. 179 (♀; Brazil). J. Bequaert, 1926, 'Med. Rept. Hamilton Rice 7th Exp. Amazon,' p. 229.

Leucotabanus leucaspis Kröber, 1929, Zoolog. Anzeiger, LXXXIII, p. 59 (♀; ?♂).

Tabanus cingulifer Walker, 1857, Trans. Ent. Soc. London, N. S., IV, 5, p. 123 (♀; Amazon Region, Brazil).

Tabanus albiscutellatus Macquart, 1850, Mém. Soc. Sci. Lille, (1849), p. 342, Pl. II, fig. 9; 1850, 'Dipt. Exot.,' Suppl. IV, p. 34, Pl. II, fig. 9 (♀; Mexico). Osten Sacken, 1878, Smithson. Miscell. Coll., No. 270, p. 60.

Chichen Itzá, State of Yucatan, two females, June 24 and 26, 1929. One was taken by sweeping the net through the air in a clearing of the bush where it was darting back and forth. It made no attempt to bite. The second specimen was resting on the trunk of a tree, some eight feet above the ground. In life the eyes are uniformly dark purplish-black.

The specimens from Yucatan agree with the female from Rio Branco, Amazonas, which I have called *T. leucaspis* in 1926; with a female from Paraguay named *leucaspis* by Bezzi; and with two females from southern Brazil received as *leucaspis* from Ad. Lutz. I have seen the same species from British Honduras (Benque Viejo), Columbia (Rio Frio), British Guiana, and Peru (Putumayo District). All these specimens have the third antennal segment not toothed nor crescent-shaped, but provided near the base with a small, sharp dorsal projection; the palpi are blackish and the sides of the thoracic dorsum as well as the scutellum are conspicuously white-haired. In size they range from 11 to 13 mm. Wiedemann mentions the black palpi and the pale yellowish sides of the notum in the original description; his specimen was about 11 mm. ($4\frac{3}{4}$ lines) long. I do not believe, therefore, that I have misunderstood this species, as Kröber infers in a recent paper (1929).

Moreover, Kröber's new description of the female of *T. leucaspis* tallies with my specimens. Whether or not his male was correctly identified is impossible to tell, although the large size (15 mm.) makes it somewhat improbable. At any rate, Kröber is not quite correct in his statement that *Tabanus albiscutellatus* Macquart is the *male* of *T. leucaspis,* since Macquart's description was based upon the *female.* Nevertheless, Macquart's *albiscutellatus* was most likely *T. leucaspis* Wiedemann, since the original description mentions the black palpi and the "small tooth" of the antennæ. At the Museum of Comparative Zoölogy, there is a female from Mexico named "*albiscutellatus* Macquart" by Osten Sacken, which is identical with *T. leucaspis* Wiedemann.

What Hine (1925, Occ. Pap. Mus. Zool. Univ. Michigan, No. 162, p. 34) and I (1926, 'Medical Rept. Hamilton Rice 7th Exp. Amazon,' p. 230) have called *T. albiscutellatus,* is a very different insect. It is larger (15 to 16 mm.), with dirty yellowish-white palpi, black antennæ, and the third antennal segment strongly crescent-shaped; the dorsum of the thorax is more uniformly white all over than in *T. leucaspis.* It does not agree with Kröber's descriptions of *T. albicans* Macquart and *T. pallidus* (Kröber), both of which have the antennæ extensively yellowish or reddish and the third antennal segment not strongly crescent-shaped. It may, however, be *T. unicinctus* Walker, which has at least the first two antennal segments black. I have this supposed *T. unicinctus* from the Republic of Honduras and British Guiana. It would seem to me that *T. albicans* Macquart, *T. albidocinctus* Bigot, and *T. pallidus* (Kröber) are one and the same species.

Diachlorus ferrugatus (Fabricius)

Chrysops ferrugatus Fabricius, 1805, 'Syst. Antliat.,' p. 111 (Carolina).

Tabanus ferrugatus Wiedemann, 1821, 'Dipt. Exotica,' I, p. 94 (♀); 1828, 'Aussereurop. Zweifl. Ins.,' I, p. 186 (♀).

Dichelacera ferrugata Walker, 1848, 'List Dipt. Brit. Mus.,' I, p. 191; 1854, *loc. cit.,* V, Suppl. 1, p. 148.

Diabasis ferrugata Osten Sacken, 1876, Mem. Boston Soc. Nat. Hist., II, p. 396 (♀).

Diachlorus ferrugatus Osten Sacken, 1876, Mem. Boston Soc. Nat., II, p. 475; 1878, Smithson. Miscell. Coll., No. 270, p. 55; 1886, 'Biol. Centr.-Amer.,' Dipt., I, p. 57. Williston, 1901, *loc. cit.*, I, p. 263. Hunter, 1901, Trans. Amer. Ent. Soc., XXVII, p. 138. Ricardo, 1904, Ann. Mag. Nat. Hist., (7) XIV, pp. 358 and 359. N. Banks, 1904, Ent. News, XV, p. 290. Aldrich, 1905, 'Cat. North Amer. Dipt.,' p. 199. Ad. Lutz, 1907, Centralbl. Bakt. Paras., Abt. 1, Orig., XLIV, p. 142. Kertész, 1908, 'Cat. Dipt.,' III, p. 211. Surcouf, 1921, 'Gen. Insect., Taban.,' p. 51. J. Bequaert, 1925, '13th Rept. United Fruit Co., Med. Dept.,' (1924), p. 205. Root, 1925, *loc. cit.*, p. 208.

Tabanus americanus Palisot de Beauvois, 1813–1820, 'Insectes Rec. en Afrique et Amérique,' p. 222, Pl. III, Dipt., fig. 6 (♀; United States). Not *T. americanus* Forster, 1771.

Diabasis atænia Macquart, 1838, 'Dipt. Exot.,' I, 1, p. 152 (no sex; in part: specimen from Carolina). Walker, 1854, 'List Dipt. Brit. Mus.,' V, Suppl. 1, p. 271.

Chrysops convergens Walker, 1848, 'List Dipt. Brit. Mus.,' I, p. 198 (♀; Honduras); 1854, *loc. cit.*, V, Suppl. 1, p. 284.

Chrysops approximans Walker, 1848, 'List Dipt. Brit. Mus.,' I, p. 198 (no sex; Florida).

Tabanus rondanii Bellardi, 1859, 'Saggio Ditter. Messic.,' I, p. 68, Pl. II, fig. 11 (♀; Mexico).

Progreso, State of Yucatan (U. S. Nat. Mus.).

I have also seen this species from North Carolina, Alabama, Louisiana, the State of Tabasco (Frontera), British Honduras (Belize River; Benque Viejo), Guatemala, and the Republic of Honduras. There is no reliable record from south of Honduras nor anywhere in the West Indies. Statements as to its supposed occurrence in Brazil are based upon Macquart's confusing two distinct species under his *Diabasis atænia*, as shown by Ad. Lutz (1913, Mem. Inst. Osw. Cruz, V, p. 164). Macquart's Brazilian specimens were either *Diachlorus curvipes* (Fabricius) or *D. bivittatus* (Wiedemann). The distribution given by Surcouf (1921), *viz.*, "Iles Carolines, Brésil," is entirely erroneous.

The markings of the eye of the female in life are shown in Fig. 1*g*.